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NEW SORGHUM VARIETIES FOR THE CENTRAL AND SOUTHERN GREAT PLAINS.

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INTRODUCTION.

New varieties of sorghum are constantly appearing, and nearly every year one or more are exploited. In many instances these are well-known forms masquerading under new names, but there are also a large number which are truly different from those in common cultivation. One prolific source of these new sorghums is the cross-pollination which takes place naturally between different varieties. The sorghums being open fertilized and the pollen readily carried by the wind, there is abundant crossing between varieties whenever two kinds which are being grown in adjoining fields come into bloom at the same time. Occasionally, also, new strains are brought over from foreign countries by friends or relatives of residents of the United States. In addition to the varieties which arise in a more or less spontaneous manner, a large number have been introduced for trial through the Office of Foreign Seed and Plant Introduction, and many are created in the breeding work of the United States Department of Agriculture and the State agricultural experiment stations.

Among the resultant host of new forms, remarkably few are found of sufficient value to compete successfully with the best standard varieties, such as Blackhull kafir, Dwarf milo, Orange sorgo, and Sumac sorgo.

Farmers should be slow to discard the standard varieties for new ones. A small acreage of the less known variety should be grown first for comparison, or the recommendations of the State agricultural experiment stations or of the United States Department of Agriculture, should be followed in the matter of adopting the newer sorts. In order to be in a position to advise farmers in regard to these new varieties the experiment stations conduct extensive variety tests.

Breeding work with the sorghums is a complex process, owing to the freedom with which they cross-pollinate and the resulting difficulty of establishing a stable variety. A farmer can rarely afford to engage in creative plant-breeding work; that is, the production of new varieties by cross-pollination. This assertion is based on several reasons: (1) The percentage of success is very small, that is, the breeder must expect to discard numberless forms before one is found that will be of sufficient value to replace the varieties now being grown; (2) the development of a variety yields little profit to the originator, because he can control neither its propagation nor its distribution; (3) the farmer is working at a disadvantage when compared with experiment stations, because in most cases he lacks a knowledge of the range of existing forms available as a basis for his breeding work; (4) extreme care and patience are necessary in plant breeding, and if the farmer devotes to it the required time his general crops are likely to be neglected and financial loss ensue.

The devotion of a farmer's time to creative plant breeding can be justified, therefore, only from an altruistic standpoint. Unless his income is assured from outside sources, it is unwise for him to engage in plant breeding except in the improvement of the standard varieties by consistent seed selection. This phase of crop improvement is well worth his time and effort.

DESCRIPTION AND ADAPTATION OF THE NEW VARIETIES OF SORGHUM.

Most of the new varieties of sorghum described in this bulletin were obtained by selection from importations made by the United States Department of Agriculture, but others have been picked up among farmers, and their exact origin is obscure. All of these have given very satisfactory results in experimental trials, and a few of them are already grown locally by farmers. In view of these facts they are deemed worthy of wide distribution, so that they may be tried under field conditions in competition with the varieties usually grown.

Typical plants of Dwarf hegari, Improved feterita, and Schrock kafir are shown in figure 1, and figure 2 shows the comparative sizes and shapes of the heads of all the varieties.

DWARF HEGARI.

Dwarf hegari is a selection (F. C. I. No. 4201) from S. P. I. No. 22326, which sorghum was obtained from the agricultural inspector at Khartum, Sudan, Africa, under the native name of Hegari. Dwarf hegari is a short, leafy strain chosen from the above number at the Forage-Crop Field Station, Chillicothe, Tex., in November, 1910.

Description.—Stems stout, five-eighths to three-fourths of an inch in diameter, 4 to 5 feet tall, medium juicy, slightly sweet, usually with but few tillers and only occasional branches; leaves 12 to 14, averaging about 3 inches broad and 24 inches long; head cylindrical to ellipsoidal, erect, medium compact, 3 inches in diameter, 7 to 8 inches long, usually well filled, exserted 2 inches above the upper sheath; seeds spherical, medium sized, white, marked with a few red and brown spots, the upper two-thirds exposed from the glume, shattering moderately; glumes ovate, black, slightly pubescent, not awned.

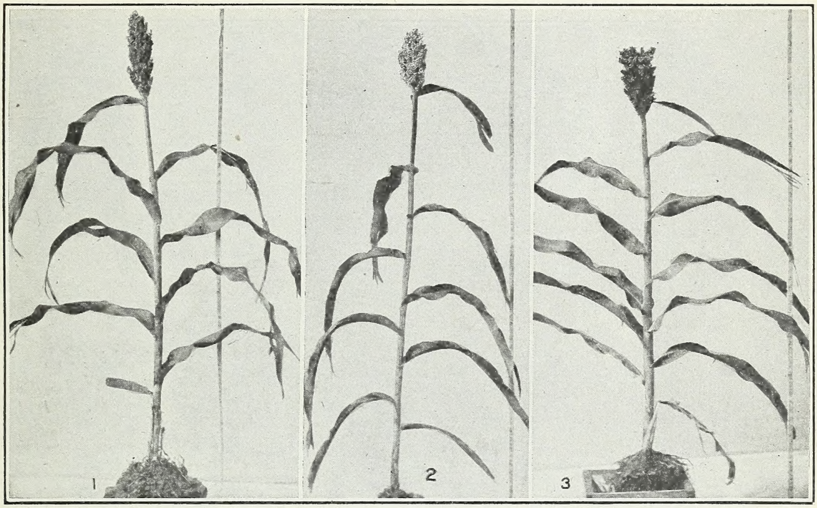

FIG. 1.—Typical plants, showing the character of the stem, leaf, and seed head: 1, Dwarf hegari; 2, Improved feterita; 3, Schrock kafir.

In general appearance Dwarf hegari resembles Dwarf Blackhull kafir very closely (fig. 1), but is nearly intermediate between it and feterita in the compactness of the panicle or head, in the size and markings of the seed, and in germinating power. It stands up well in storms, lodging very little. The growing season averages 96 to 100 days under normal conditions on the Great Plains.

This variety has become well known in the vicinity of Chillicothe, Tex., and the acreage has increased rapidly in the past two years. Many farmers prefer it to Dwarf milo on account of its higher forage value and the greater ease of harvesting due to the erect heads. Its early maturity has caused it to be looked upon favorably as far north as central Nebraska.

IMPROVED FETERITA.

Improved feterita (S. P. I. No. 22329) was obtained from the Sudan region of Africa in 1908, two years after the first successful importation of this sorghum. Since its introduction it has been improved by selection, and in field trials has shown a consistently higher yielding power and more uniform growth than the earlier importation (S. P. I. No. 19517), from which most of the feterita now being grown in the United States has come.

Description.—Stems medium to stout, five-eighths to three-fourths of an inch in diameter, 5 to 6 feet tall, with little or no juice, only slightly sweet, and having few tillers and only occasional branches; leaves 10 to 12, averaging 2½ to 3 inches broad and 20 to 22 inches long; head ovoid to ellipsoidal, erect, medium compact, 3 to 3½ inches in diameter, 7 to 7½ inches long, usually well filled, exserted 2 to 3 inches above the upper leaf sheath; seeds circular in outline, slightly flattened, large, white, the upper two-thirds exposed from the glume, shattering rather easily; glumes ovate, black, slightly pubescent, not awned.

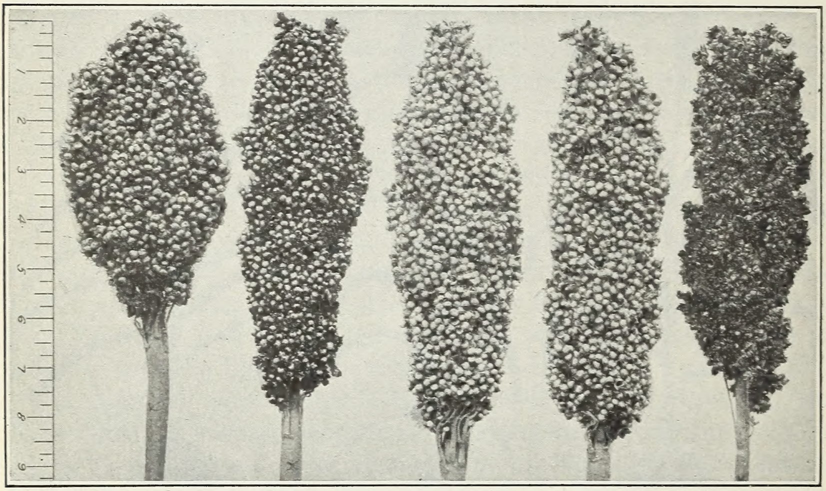

FIG. 2.—Seed heads of the new varieties of sorghum, showing their size, shape, and color. The measure (at the left) is graduated to inches and fractions thereof. From left to right: White milo, Dwarf hegari, Improved feterita, Dwarf feterita, and Schrock kafir.

Improved feterita, except for its greater uniformity and consequent shorter growing season, averaging about 90 to 100 days, does not differ from the ordinary feterita now so widely grown throughout the Great Plains (fig. 1). Compared with Dwarf feterita, this selection has a somewhat heavier stalk and appears to be more leafy, giving it a higher forage value than Dwarf feterita under most conditions (fig. 3).

DWARF FETERITA.

Dwarf feterita is a selection (F. C. I. No. 811) from S. P. I. No. 22329. The plant selected in 1909 by the senior writer at San Antonio, Tex., was only 2½ feet high and was fully mature two weeks in advance of the general crop of feterita. It has not fully retained either its dwarfness or its earliness, but seems each succeeding year to be nearer the type of ordinary feterita, so that rigid selection appears necessary to maintain its distinctiveness.

Description.—Stems medium to slender, one-half to five-eighths of an inch in diameter, 4½ to 5½ feet tall, slightly sweet, scarcely juicy, usually with but few tillers, and only occasional branches; leaves 9 to 10, averaging 2 to 2½ inches broad and 18 to 20 inches long; head ovoid to ellipsoidal, erect, medium compact, 3 inches in diameter, 6 to 7 inches long, usually well filled, exserted 4 inches above the upper leaf sheath; seeds circular in outline, slightly flattened, large, white, the upper two-thirds exposed from the glume, shattering rather easily; glumes ovate, black, slightly pubescent, not awned.

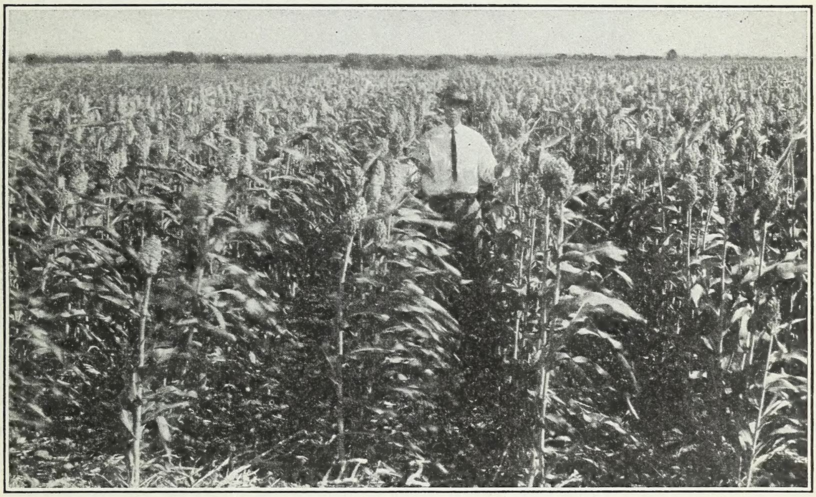

FIG. 3.—The first cutting of the two new varieties of feterita at Chillicothe, Tex., in 1914. Dwarf feterita (at the left) and Improved feterita (at the right). Plats planted on April 21. Photographed July 20.

Dwarf feterita in its present form has a rather more slender stalk than ordinary feterita, and the head is a trifle smaller. It ripens about 4 days earlier, the growing season averaging 88 to 96 days, but except for the size of the plant, the length of the growing season, and its greater uniformity there is no difference between it and ordinary feterita. As is also the case with Dwarf hegari, two seed crops of Dwarf feterita can sometimes be harvested in one season (fig. 4). This variety of feterita would seem to be of value as an insurance against drought. At Amarillo, Tex., in 1913, when practically all the kafirs and milos were failures, this variety headed out at a height of 2½ to 3 feet and made a grain yield of 15 bushels per acre when ordinary Blackhull kafir under exactly similar conditions produced hardly a head (fig. 5).

WHITE MILO.

The exact origin of White milo is in doubt, but it seems probable that the variety as it is now being grown in the United States originated from certain importations of sorghums from India. Several sorghums very similar in character to the common White milo were included in a shipment received by the United States Department of Agriculture in 1903, and it is easy to believe that such differences as exist in the two forms may have come about through a process of seed selection carried on by farmers.

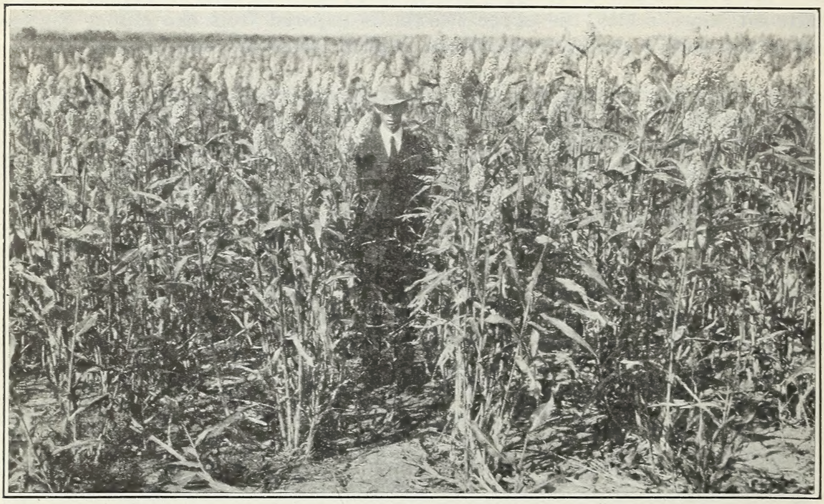

FIG. 4.—Second cutting of the two new varieties of feterita at Chillicothe, Tex., in 1914. Dwarf feterita (at the left) and Improved feterita (at the right). The first cutting was removed on July 25. Photographed October 15.

In the early history of sorghums in this country the name White milo, or more often "White milo maize," was associated with "Rural Branching sorghum." This sorghum, however, from descriptions and specimens preserved, proves to be a kafir rather than a milo. The present strain, on the contrary, is a true milo, having the transverse corrugations on the glume and other distinctive marks of the milo group. True White milo appears to have been grown locally in northern Texas for several years, but its history in this locality is vague. Seed of what appeared to be a dwarf strain of this true White milo was obtained in 1911 by Mr. G. E. Thompson, at that time superintendent of the Forage-Crop Field Station at Chillicothe, Tex. This strain (F. C. I., No. 5886) has been grown at that station with good results since that time, but like the Dwarf feterita it does not appear to maintain its dwarf characteristics without continued selection.

Description.—Stems medium to slender, one-half to five-eighths of an inch in diameter, 4½ to 5½ feet tall, lacking both juice and sweetness, having no branches and but few tillers; leaves 12 to 13, about 2½ inches broad and 22 to 26 inches long; head ovoid, mostly erect, sometimes recurved, compact, 3 to 4 inches in diameter, 5 to 6 inches long, usually well filled, exserted 4 to 6 inches above the upper leaf sheath; seeds slightly flattened, medium to large, white, the upper three-fifths exposed from the glumes, shattering little; glumes broadly ovate to orbicular, red-brown to greenish gray, slightly pubescent, awned.

White milo is taller and rather more slender than ordinary Dwarf milo, and only about 20 per cent of the seed heads are recurved in ordinary plantings. The seed except for its white color resembles that of ordinary Dwarf milo very closely, but it is usually mature a few days earlier, the average growing season for the crop being 88 to 96 days. White milo seems to share with feterita the ability to make a seed crop under deficient moisture conditions.

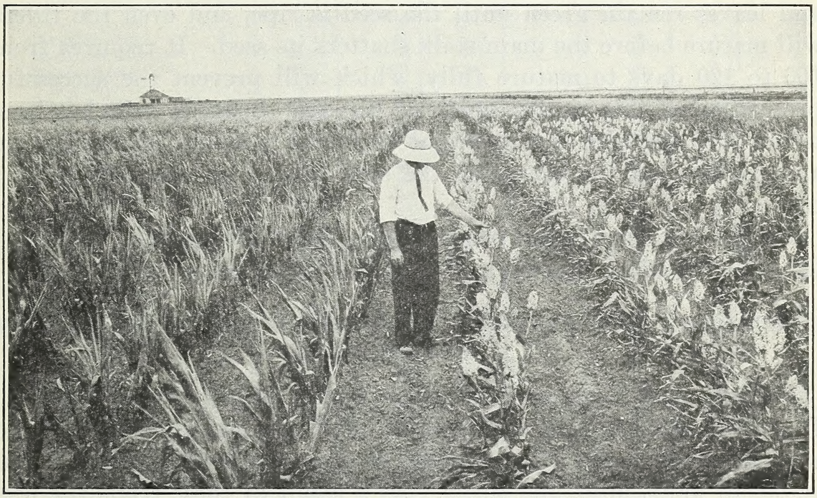

FIG. 5.—Ordinary Blackhull kafir (at the left) and Dwarf feterita (at the right), showing the superior ability of the feterita to make a seed crop under conditions of extreme drought. Amarillo, Tex., 1913.

SCHROCK KAFIR.

The Schrock variety of kafir, which is difficult to classify on account of its rather peculiar combination of characters, was discovered by Roy Schrock, a mail carrier at Enid, Okla., in 1912. Seeing a vigorous and very heavily seeded plant growing in a field along his route, he gathered the seed and took it home to plant the following year. In 1913 Mr. Schrock grew a row of it in his garden and sent a sample to the United States Department of Agriculture for identification. It appears to be a hybrid between some kafir and a sweet sorghum, very likely Black Amber.

Description.—Stems stout, three-fourths to 1 inch in diameter, 4½ to 5 feet tall, medium juicy, rather sweet, with only occasional branches and few tillers;

leaves 12 to 14, averaging 3 to 3½ inches broad and 24 to 28 inches long; head club shaped, erect, medium compact, 3 to 3½ inches in diameter, 7 to 8 inches long, usually well filled, the base of the head sometimes inclosed by the boot; seeds ovoid, slightly flattened, medium sized, brown, the upper one-third or one-fourth exposed from the glume, shattering very little; glumes ovate, black or dark red-brown, glabrous or slightly pubescent, not awned.

Schrock kafir has leaves as broad and somewhat longer than those of Blackhull kafir, so that the plant presents an exceedingly leafy appearance (fig. 1). The head is about the same size, but not so compact as that of the ordinary kafir. The seeds are pointed at the tip, like those of the sweet sorghums, and are like them also in that they contain a noticeable percentage of tannin. The stem and leaves remain green until the seed is ripe, and even the tillers will mature before the main stalk shatters its seed. It requires from 100 to 120 days to mature fully, which will prevent the successful production of this variety north of Kansas. Schrock kafir has been tested with the idea that it might be found valuable for both grain and fodder, but the tannin in the seed lessens its value as a grain crop.

Figure 2 shows typical heads of all five of the varieties described in this bulletin and gives an idea of their size, shape, and color.

COMPARISON OF THE FIELD RECORDS OF THE NEW SORGHUM VARIETIES.

For the past three or four years Dwarf hegari, Dwarf feterita, Improved feterita, and White milo have been grown at three field stations in the Great Plains region in comparison with standard varieties of kafir, milo, and sorgo. As a result of these trials the new varieties are being distributed to farmers in order to obtain their judgment on the usefulness of these sorghums. The figures on yields of forage and seed, with statements regarding stands, height of plants, and length of the growing season, for Chillicothe, Tex., Amarillo, Tex., and Hays, Kans., respectively, are given in Table I. The size of the plats used in obtaining these data is stated in connection with the table. The yields of fodder are given in terms of field-cured material in all cases except at Hays, Kans., in 1915, where the moisture content in the fodder was corrected to a uniform basis by means of air-dried samples.

TABLE I.—*Comparative growth and yield of the new and of standard varieties of sorghum at two stations in Texas and one station in Kansas in 1913, 1914, and 1915.*

Place, year, and variety.	Serial No.	Season.	Row space.		Height.	Acre yield.	
			Plant.	Stalk.		Fodder.[1]	Grain.
AT CHILLICOTHE, TEX.							
1913 (very dry season):		*Days.*	*Inches.*	*Inches.*	*Inches.*	*Tons.*	*Bushels.*
Dwarf hegari	4201	....	18	....	43	1.04	(2)
Dwarf feterita	811	111	27	....	48	.97	10.71
Improved feterita	22329	....	19	....	50	.80	8.03
Standard feterita	19517	110	21	....	55	1.04	10.71
White milo	5886	109	16	....	44	1.10	17.5
Dwarf milo	18684	113	20	....	33	1.12	11.9
Dwarf kafir	24983	....	....	....	43	1.05	(2)
Blackhull kafir	17569	....	14	....	33	.95	(2)
1914 (medium season):							
Dwarf hegari [3]	4201	89	10	....	48	6.10	56.6
Dwarf feterita [3]	811	92	7.8	....	54	4.95	53.5
Improved feterita [3]	22329	96	7.7	....	57	6.05	51.5
Standard feterita [3]	19517	101	8	....	68	5.85	40.8
White milo	5886	91	6.9	....	60	3.06	21.3
Dwarf milo [3]	18684	96	7.1	....	42	4.83	41.1
Dwarf kafir	24983	102	7.3	....	42	2.60	13.1
Blackhull kafir	17569	104	6.9	....	48	3.85	12.5
1915 (very wet season):							
Dwarf hegari	4201	104	9.1	7.3	58	4.54	38.4
Dwarf feterita	811	83	9.1	6.9	54	2.52	28
Improved feterita	22329	84	8.3	6.5	57	2.47	27.3
White milo	5886	85	9.4	6.7	58	2.37	32.5
Dwarf milo	18684	101	7.9	5.8	50	3.60	36.8
Dwarf kafir	24983	101	8	6.6	51	3.20	28.6
Blackhull kafir	17569	114	....	....	63	4.27	39.82
Schrock kafir	1481	99	7.4	5.8	58	3.87	46
Average, 1913 to 1915: [4]							
Dwarf hegari	4201	97	12.3	....	49	3.89	31.7
Dwarf feterita	811	88	14.6	....	52	2.81	30.7
Improved feterita	22329	90	11.6	....	55	3.11	28.9
Standard feterita [5]	19517	106	14.5	....	61	3.44	25.7
White milo	5886	88	10.8	....	54	2.18	23.8
Dwarf milo	18684	99	11.6	....	42	3.18	29.9
Dwarf kafir	24983	104	7.6	....	45	2.28	13.9
Blackhull kafir	17569	109	10.4	....	48	3.02	17.4
AT AMARILLO, TEX.							
1913 (extremely dry season): [6]							
Dwarf hegari	4201	90	3	2.5	20	.50	0
Dwarf feterita	811	81	11	5	34	1.10	14.70
Improved feterita	22329	81	12	4.8	46	1.20	24.10
Standard feterita	19517	84	10	4.7	36	1.28	13.10
Dwarf milo	18684	97	6	3.9	24	1.03	2.07
Dwarf kafir	24983	110	13.3	7.4	28	.45	0
Blackhull kafir	17569	120	4.5	2.6	34	1.33	0
1914 (medium season): [7]							
Dwarf hegari	4201	90	5	2	43	3.18	25
Dwarf feterita	811	90	7.8	2.6	55	2.87	28.5
Improved feterita	22329	92	8.4	3.1	55	2.09	14.1
Standard feterita	19517	92	11.8	4.3	54	2.16	13.8
White milo	5886	94	6.2	2.4	52	1.93	20.4
Dwarf milo	18684	94	6.2	2.3	36	2.08	18.6
Dwarf kafir	24983	100	7.2	3.5	45	2.42	20.1
Blackhull kafir	17569	117	2.6	2.3	46	2.90	2.4
1915 (very wet season): [8]							
Dwarf hegari	4201	108	19.47	7.18	52.5	3.25	43.66
Dwarf feterita	811	108	14.82	4.33	66	3.52	51.55
Improved feterita	22329	108	14.48	4.18	65	4.53	52.93
Dwarf milo	18684	115	19.36	5.24	46.5	4.37	52.60
Dwarf kafir	24983	123	8.53	4.59	60.5	5.00	65.99
Blackhull kafir	17569	133	14.84	7.17	72	5.66	58.83
Schrock kafir	1481	131	6.25	4.28	66	7.30	55.83

[1] The term fodder includes the entire plant before the seed head is removed. The yields were all obtained from duplicate twentieth-acre plats except that of Improved feterita in 1913, which was from one row 8 rods long.

[2] Few heads.

[3] Yields of these varieties are the total from two cuttings.

[4] The average for the growing season is based on results obtained in 1914 and 1915 except in the case of feterita No. 19517.

[5] The results of two years, 1913 and 1914.

[6] The yields for 1913 were all obtained from 0.03-acre plats except that of Improved feterita, which was grown in only one 8-rod row.

[7] The yields for 1914 were all obtained from duplicate fiftieth-acre plats.

[8] The yields for 1915 were all obtained from duplicate twentieth-acre plats.

TABLE I.—*Comparative growth and yield of the new and of standard varieties of sorghum at two stations in Texas, etc.*—Continued.

Place, year, and variety.	Serial No.	Season.	Row space.		Height.	Acre yield.	
			Plant.	Stalk.		Fodder.	Grain.
AT AMARILLO, TEX.—Contd.							
Average, 1913 to 1915:		*Days.*	*Inches.*	*Inches.*	*Inches.*	*Tons.*	*Bushels.*
Dwarf hegari	4201	96	9.16	3.89	38.5	2.64	22.89
Dwarf feterita	811	93	11.21	3.97	51.7	2.50	31.58
Improved feterita	22329	94	11.63	4.03	55.3	2.94	30.38
Dwarf milo	18684	102	10.52	3.81	35.5	2.49	24.42
Dwarf kafir	24983	111	9.68	5.16	44.5	2.62	28.70
Blackhull kafir	17569	123	7.31	4.02	50.7	3.30	20.41
AT HAYS, KANS.							
1914 (medium to poor season):[1]							
Dwarf hegari	4201	102	8.6	4.6	53	3.14	11.2
Standard feterita	19517	93	12.3	7	71	2.44	25.7
White milo	5886	90	7.6	4.3	60	2.51	31.9
Dwarf milo	18684	102	7.7	3.8	46	2.44	14.2
Dwarf kafir	24983	102	9.3	7.1	52	3.16	30.6
Blackhull kafir	17569	102	3.5	2.9	54	3.55	9
Schrock kafir	1481	102	11	7.3	47	2.26	7.5
1915 (very wet and cold season):[2]							
Dwarf hegari	4201	107	7.3	....	66	3.54	40.7
Dwarf feterita	811	107	6.3	....	80	3.46	23.8
Improved feterita	22329	107	5.5	....	84	3.51	27
White milo	5886	100	3.2	....	84	4.34	42.1
Dwarf milo	18684	112	4.6	....	70	4.89	40.9
Dwarf kafir	24983	115	7	....	72	3.41	24.7
Blackhull kafir	17569	115	6.2	....	80	4.15	12.3
Schrock kafir	1481	115	6.4	....	70	3.44	8.5
Average, 1914 and 1915:							
Dwarf hegari	4201	105	8	....	60	3.34	26
Feterita[3]	....	100	8.9	....	77.5	2.98	26.4
White milo	5886	95	5.4	....	72	3.48	37
Dwarf milo	18684	107	6.2	....	58	3.67	27.6
Dwarf kafir	24983	109	8.2	....	62	3.29	27.7
Blackhull kafir	17569	109	4.9	....	67	3.85	10.7

[1] The yields given are from duplicate twentieth-acre plats.
[2] The yields given are from duplicate 3/200-acre plats.
[3] The results for feterita include those for S. P. I. No. 19517 in 1914 and for S. P. I. No. 22329 in 1915.

The results shown in Table I represent fairly accurately, it is believed, the value of these varieties in the localities named. It is fortunate that the period covered by this work includes a wet year, a dry year, and one of average weather conditions.

VALUE OF THE VARIETIES IN DIFFERENT PORTIONS OF THE GREAT PLAINS.

REGION ADJACENT TO CHILLICOTHE, TEX.

In 1914 a wet fall followed a rather dry but not especially unfavorable summer, and this abundance of moisture in the fall enabled the early-maturing varieties, like feterita and Dwarf hegari, to produce second crops of grain as well as fodder. This resulted in greatly augmented yields of the three varieties of feterita, of Dwarf hegari, and also of Dwarf milo. The yield from the first cutting, which was harvested in the ordinary way with a row binder, was as follows: Dwarf hegari, 17; Dwarf feterita, 24.9; Improved feterita, 23.8; Standard feterita, 23.4; and Dwarf milo, 22.3 bushels per acre. The second cutting, produced from tillers starting at the base of the stubble, was more uniform than the first cutting, and in the Dwarf hegari and the Dwarf and Improved varieties of feterita the yield of grain was greater than that from the first cutting (fig. 4). In fields of these crops where the first crop of grain had been gathered by heading, the second crop was much less uniform and was inferior in every respect to that produced where the first cutting was made with a row binder and the plants were cut off near the ground. Additional expense is entailed, of course, in the harvesting of two crops, but the potential value of a variety must be determined from its actual production of forage and grain, together with the feeding value of the product.

It appears from the results obtained at Chillicothe that the feteritas and White milo are of most value in dry seasons and that the feterita and Dwarf hegari will under favorable conditions produce two crops in one season, while ordinary Blackhull kafir will make only one crop and in very dry seasons does not even head out. Both the new varieties of feterita, F. C. I. No. 811 and S. P. I. No. 22329, are superior to the strain now being generally grown and should be widely utilized as soon as an adequate supply of seed is available.

During the period represented by this test, Dwarf hegari ranks first, with an average yield of 31.7 bushels of grain and 3.89 tons of fodder per acre. In quality the fodder is not quite equal to that of the Blackhull kafir, but it is superior both to feterita and to milo fodder.

The White milo, although maturing quite early, lacks the required vitality or the tendency to produce tillers which is necessary for a second growth. This failure to produce two seed crops in 1914 lowered the rank of this variety in the averages. It is somewhat taller and not so leafy as the ordinary Dwarf milo, and without further improvement can hardly be expected to replace this well-known sort in the region surrounding Chillicothe. There is evidence, however, that it is capable of decided improvement by selection, both in regard to its leafiness and its dwarfness. A field of White milo much improved in both of these characters was found on the farm of Mr. W. W. Cole, near Chillicothe. This field is illustrated in figure 6. It was quite uniform in height, and in shape and size of the head resembled the ordinary Dwarf milo very closely. If it behaves similarly in future plantings, a variety of Dwarf White milo will be available similar to the Dwarf Yellow milo in everything but color of seed.

REGION ADJACENT TO AMARILLO, TEX.

Climatic conditions are more severe at Amarillo than at Chillicothe, Tex., the normal rainfall and temperature both being lower. However, the unusually good season of 1915, with its high yields, raised the averages for the period to a figure practically equaling the yields at Chillicothe. At Amarillo, feterita, besides showing an ability to make crops under extremely adverse conditions (fig. 5), also stands first in the averages for the three years.

It is very probable that feterita will continue to be grown quite extensively on the high plains of northwestern Texas, although its tendency to shatter the seed when not harvested promptly and the evident low vitality of the seed when planted in cold soil will no doubt cause most farmers to depend on ordinary Dwarf milo for their grain crop. Both the Dwarf and the Improved feterita proved consistently superior to the common strain of feterita at Amarillo, as well as at Chillicothe.

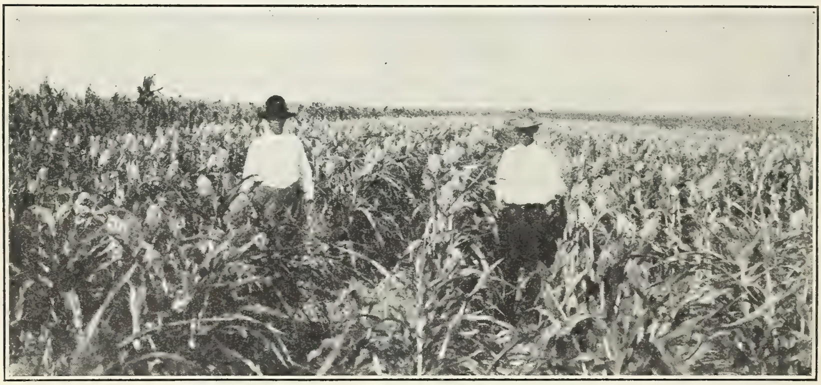

FIG. 6.—A field of Dwarf White milo on the farm of Mr. W. W. Cole, Chillicothe, Tex. Photographed July 24, 1914.

Failure to include White milo in the 1913 and 1915 plantings prevents any fair comparison of it with the feterita or Dwarf milo under Amarillo conditions, but judging from the record of White milo at Hays, Kans., it may be expected to produce a good grain yield at Amarillo also.

Dwarf hegari appears to be less promising on the high plains about Amarillo than at Chillicothe, and, judging from the results obtained, it is not likely to become as popular there as near the latter point, where a considerable number of farmers are already growing it in preference to feterita, Dwarf milo, and Blackhull kafir.

REGION ADJACENT TO HAYS, KANS.

The season of 1913 was so severe at Hays that all the crops were practically failures. No seed yields were obtained from any of the varieties, although Dwarf hegari and feterita made small yields of forage, as did also the Dwarf kafir. Insects completely destroyed the plantings of Dwarf milo, this variety appearing especially susceptible to the attacks of both chinch bugs and grasshoppers.

In 1914, which was an average season but with several periods of rather acute drought, feterita, White milo, and Dwarf kafir made especially good yields of grain and fair yields of fodder. The high grain yields of feterita and Dwarf kafir may have been partly due to the thin stands of these two strains, but this can not be offered as a reason for the good showing of the White milo. Dwarf hegari produced a good yield of fodder, but the seed yield was rather low.

In the season of 1915, which was very cold and wet during the spring and early summer, all the sorghums started poorly and had to be replanted. The cold weather was disastrous to feterita and retarded the growth of the kafirs to such an extent that they failed to mature fully before frost, Blackhull kafir and Schrock kafir being in the milk stage and Dwarf kafir in the soft-dough stage when frost came. Dwarf hegari, White milo, and Dwarf milo made almost equally good yields of grain, but the milos both outyielded Dwarf hegari in fodder. The quality of Dwarf hegari fodder, however, is considerably better than that of the milo, so that the advantage of the milos in this feature is more apparent than real. In the averages for the two years, White milo appears to be much the best from a grain standpoint, while Dwarf hegari, feterita, Dwarf milo, and Dwarf kafir, averaging about 10 bushels less in grain yield than the White milo, are approximately equal to it and to each other in forage yield. From these results one must conclude that the best general-purpose sorghum for this region is Dwarf kafir, since the fodder is much superior to that of the milos or feterita (fig. 7). For a purely grain sorghum, White milo deserves a more extensive trial, especially in the northwestern part of Kansas, southwestern Nebraska, and eastern Colorado. Ordinary Blackhull kafir and Schrock kafir, although more leafy and perhaps producing a better quality of fodder than Dwarf kafir, are not early enough in maturing to warrant their growth in western Kansas.

GENERAL CONCLUSIONS.

Schrock kafir has been introduced in the tabulation (Table I) merely because of the interest which has been aroused in it and to provide data to answer questions regarding its comparative value. It will be seen that its long growing season prevents it from being a success at Hays, Kans. Farther south, however, at both Chillicothe and Amarillo, Tex., it made good yields, and in 1915 it was the highest yielding sorghum at Woodward, Okla. Even with such results it can not be recommended as the ideal dual-purpose sorghum; that is, one that will furnish high yields and a good quality of both forage and grain, because the seeds have an appreciable amount of tannin in them, and this lowers its feeding value. The presence of this tannin also adds to the evidence supporting the theory that Schrock kafir is in reality a hybrid of kafir and some sorgo, since all the sorgos, so far as at present known, have tannin in the seed. While Schrock kafir may be found to possess considerable merit as a silage sorghum, it is not likely that any variety will be generally grown because it has superior value for silage alone.

No general recommendation for all these varieties covering the whole region of the Great Plains can be made. It is quite likely that each locality will in time come to favor some particular variety of sorghum, much as is now the case with corn. Dwarf hegari, Dwarf feterita, and Improved feterita have all been brought to their present standard of excellence by continued selection. Whether all or any of them will in time become established varieties in any community will depend on the impression they create on the farmers after they have been grown under actual field conditions for several years. The present publication is prepared, not for the purpose of urging their general adoption in preference to present well-known varieties, but to provide a source of information in regard to them at a time when they are being sent out for trial among farmers.

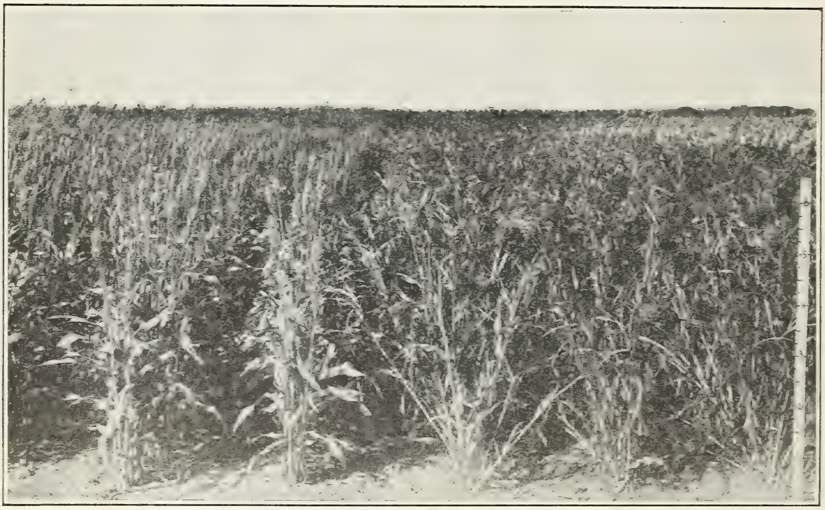

FIG. 7.—Dwarf Blackhull kafir (at the left) and Dwarf milo (at the right) at Hays, Kans., in 1915.

Dwarf hegari has become quite popular around Chillicothe, Tex., and can be highly recommended for the whole sorghum region in

Texas which lies south and east of the Panhandle. It also deserves a more extended trial in New Mexico, Arizona, and southern California, and through central Oklahoma and western Kansas. Several enthusiastic reports concerning Dwarf hegari have been received from southwestern Nebraska. The Nebraska branch experiment station at Curtis rates it above feterita for their conditions.

Dwarf feterita and Improved feterita should be substituted for ordinary feterita where the latter is now being grown. Feterita has shown an ability to produce crops under very low moisture conditions, and through a long series of years these two selected strains will very likely make a larger grain yield than either Dwarf milo or Dwarf kafir on the high plains of northwestern Texas, western Kansas, and eastern Colorado. The most grievous fault of feterita, that of poor germination, can perhaps be remedied by selective breeding.

White milo has made an enviable record in the matter of seed production at all of the field stations concerned in these reports. When exhibited at State and county fairs in the sorghum region it has often taken first premium in competition with the ordinary milo. The quality of fodder produced is rather inferior, but from the standpoint of grain production alone it is worthy of a much more extended planting in northwestern Texas, western Oklahoma, western Kansas, eastern Colorado, and western Nebraska.

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